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ABSTRACT

The purpose of this study was to consider how the development of a school district technology plan facilitates meaningful use of technology in the classroom. The experiences of the Boone Community School District (Iowa) were the focus of the case study, from the formation of a technology planning committee to the implementation of an expanded use of technology in upper-elementary classrooms. Components of the research include document analysis of a district technology plan, interviews with technology plan committee members, fieldwork observations, and interviews with teachers. The study demonstrated that effective technology planning can lead a district through establishment of a technology infrastructure, including a district-wide network, Internet access to all classrooms, and high quality staff development. Findings suggest that teachers need curriculum integration support, beyond what is often provided in the technology plan, in order to take full advantage of available technology. (Contains 22 references.) (Author/MES)

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Technology Planning and Technology Integration: A Case Study

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Abstract: The purpose of this study was to consider how the development of a school district technology plan facilitates meaningful use of technology in the classroom. One school district's experiences were the focus of the case study, from the formation of a technology planning committee to the implementation of an expanded use of technology in upper-elementary classrooms. Components of the research include document analysis of a district technology plan, interviews with technology plan committee members, fieldwork observations and interviews with teachers. The study demonstrated that effective technology planning can lead a district through establishment of a technology infrastructure, including a district-wide network, Internet access to all classrooms, and high quality staff development. Findings suggest that teachers need curriculum integration support, beyond what is often provided in the technology plan, in order to take full advantage of available technology.

School reform continues to be a focal point in education today, as it was in 1983 with the publication of the *A Nation at Risk* report (National Commission on Excellence, 1983). School improvement planning and technology integration are two areas that emerge from the reform agenda in K-12 education today (Mehlinger, 1995; President's Committee of Advisors on Science & Technology, 1997). Technology integration is offered as one of the cornerstones of the school reform effort (Collins, 1991; David, 1991; Kelly, 1990, Pearlman, 1989). However, Mehlinger makes the point that "we have scarcely begun to understand the role technology will play in schools of the future. ...Technology is not merely another reform idea, like site-based management or ungraded elementary schools; it will force a reconsideration of the very nature of schooling itself" (Mehlinger, 1995, p. 8). Schools are investing large sums of money into hardware and software, with the expectation that teachers will use instructional technology to improve student learning (Hope, 1995; Means & Olson, 1994; Office of Technology Assessment, 1995). Research shows that technology use in classroom instruction is increasing, however, meaningful integration into the curriculum remains the exception rather than the norm (Dryli & Kinnaman, 1994; O'Neil, 1995).

Researchers have identified many barriers to the use of instructional technology (Marcinkiewicz, 1994; OTA, 1995; Smith & O'Day, 1990), including lack of access to suitable hardware, poor quality software, inadequate staff development, lack of technical assistance, and teacher resistance to changing instruction. Planning guides for technology advise school districts to address these issues in their strategic plans and administrative practices (Dryli & Kinnaman, 1994; Kimball, 1996; Kimball & Sibley, 1997). However, it is difficult to sort out the factors related to the planning process from the implementation factors involving changes in instruction and learning.

The state of Iowa made efforts to help school districts make advances in use of technology through state funding initiated in 1996 (Iowa code, §295, 1996). A requirement of the funding was the development of a multi-year technology plan. The purpose of this case study was to examine whether development of the required technology plan facilitates meaningful use of technology in the classroom. The study began with the selection of one Iowa school district, Boone Community School District (Boone CSD), based on its strong technology plan document. The district's planning process of 1996/97 was examined retrospectively. The study then followed the implementation of a planned technology integration project at the upper-elementary classroom level. Each classroom, grades 3-5, received a second computer at the beginning of the 1998/99 school year, explicitly for student use. Classrooms doubled their access to technology by having available two multimedia, Internet-capable computers and the means to display the computer image on a classroom television. For teachers not yet using technology with students, this new addition to the classroom sent the message that technology should be integrated into the teaching and learning process.

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Review of Literature

The President's Committee of Advisors on Science and Technology (PCAST, 1997) recently published the *Report to the President on the Use of Technology to Strengthen K-12 Education*. In the report, the promise of technology's role in school transformation is expressed.

> While a number of different approaches have been suggested for the improvement of K-12 education in the United States, one common element of many such plans has been the more extensive and more effective utilization of computer networking and other technologies in support of a broad program of systemic and curricular reform... Particular attention should be given to the potential role of technology in achieving the goals of current educational reform efforts through the use of new pedagogic methods focusing on the development of higher-order reasoning and problem-solving skills. (p. 6-7)

While Kimmel and Deek (1995) agree that technology can play a key role in the school reform effort, they warn that educational technology should not be considered a "panacea for educational reform" (p. 327). They stress that curriculum, in the hands of good teachers, should drive the use of technology. They identify active student involvement and integration of technology as two educational practices growing out of the school reform movement. Collins' (1991) survey of the literature on the role of computer technology in school reform agrees, but he adds that classroom use of technology may help to reduce the didactic style of teacher-led instruction and allow a more constructivist practice in teaching and learning (p. 36).

Although gains have been seen, the full impact of instructional technology has only been seen in a small portion of classrooms (Becker, 1994). This is due in part to administrative and organization factors at the district-level. To help with these district-level decisions, a number of guides to the technology planning process have been developed (Anderson, 1995; Kimball & Sibley, 1997; NCRTEC, 1996). In a study of technology planning in California schools, Kimball (1996) identified components of strong technology plans by reviewing available educational research and planning guides. He then confirmed the findings by surveying technology practitioners in California. This process yielded nine essential components for a strong technology plan (Kimball, 1996, p. 74). These components are (1) broad-based support in the planning process, (2) comprehensive needs assessment, (3) vision based on the school district's overall vision, (4) goals based on the vision, (5) action plans for achieving the goals, with timelines, responsibilities, and budget, (6) plan for evaluation of progress, (7) multi-year planning, (8) elaboration on the curriculum integration of technology, and (9) planning for staff development. In Kimball's examination of the plans required by California legislation, he found that only 47% of the districts submitted plans, and these were of "questionable quality and indeed, ... for the most part inadequate" (Kimball, 1996, p. 83-84). Dyrli and Kinnaman (1994) also found technology plans to be inadequate. The focus of many technology plans has been on hardware acquisition, resembling a shopping list of the latest fads, without apparent thought to integration into teaching and learning.

To remedy this situation, most planning guides recommend that the technology planning committee begin by identifying the district's vision for learning, then determine how technology can support that vision. Only then is the committee ready to begin the process of needs assessment, goal setting, and action planning.

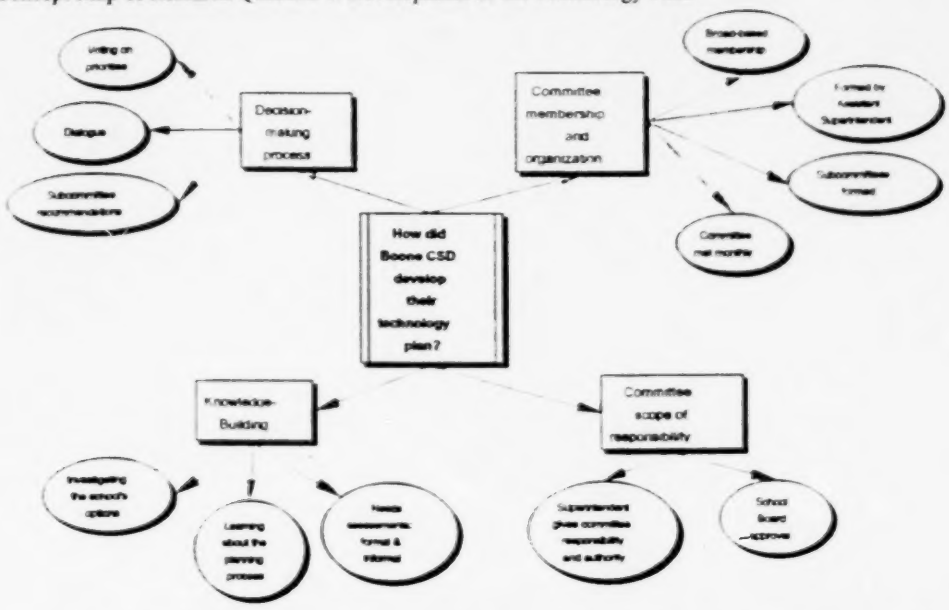
To better understand these issues, two research questions were addressed. (1) How did Boone Community School District develop their technology plan? (2) How did the district's technology planning process impact the integration of computer technology into the teaching and learning process? Descriptive, qualitative case study was selected as the primary research method for the examination of the efforts of technology integration in one school district. Components of the research included document analysis of a district technology plan, interviews of people involved in the technology plan preparation, fieldwork observations and interviews with teachers.

Findings

The Iowa School Improvement Technology Act (Iowa code, §295, 1996) required school districts to submit a board-approved technology plan to their regional Area Education Agency (AEA) by June 1, 1997. Boone Community School District began to develop their plan in September 1996. The development process was detailed during interviews with seven members of Boone's Technology Committee and through review of the completed *Educational Technology Plan* (Boone CSD, 1997).

Important components of the technology planning process that emerged from interviews include "Committee Membership and Organization," "Committee Scope of Responsibility," "Knowledge-building," and "Decision-making and Writing Process." These components are illustrated in Figure 1.

Figure 1
Concept Map of Research Question 1: Development of the Technology Plan



The formation of the Educational Technology Planning Committee was a first step in the development of the plan. Members were selected by the assistant superintendent to represent the elementary buildings, middle school, and high school. Community members and support staff were also selected. All of the district media specialists served on the committee. The committee met monthly throughout the school year under the leadership of the assistant superintendent and district media specialist. Members felt the Technology Committee represented the district well, although having twenty members made the process difficult at times.

After initial work trying to write a vision statement as a whole committee, the need for subcommittees or work groups was recognized. A vision subcommittee was formed, as well as other subcommittees to investigate hardware, software and curriculum, personnel, staff development, and staff competencies. The subcommittees met as needed to discuss options and develop recommendations to the larger committee. Subcommittees were credited with allowing leadership to emerge. One member commented,

> We had members of the committee who were very effective. When we divided up into subcommittees different people took leadership roles and really got their subcommittees going.

The district's superintendent did not directly participate on the Technology Committee but a committee member commented, "He met with our committee maybe the first meeting and said his main concern was to get more technology, especially computer technology, into the hands of the kids." The superintendent was also instrumental in authorizing the Technology Committee to allocate the budget available through state technology funds and other sources.

Committee members and district administrators recognized their scope of responsibility to include hardware, software, technology support personnel, staff development, and networking. Several members mentioned that the superintendent, when asked to make a decision related to technology, would suggest that the person "take it to the technology committee and see what they want to do." Looking back over the past years since the plan was written and approved by the board, one committee member expressed, "I think that our committee really worked hard that first year, but I think it has been rewarding because our plan does actually guide what we're going to do."

Committee members spoke about areas of knowledge they needed to develop in order to complete the technology plan. They needed to learn about effective planning processes, the existing situation in their schools, and the range of possibilities with instructional technology. They gained this knowledge through research, participation in an AEA Technology Planning Institute, and by conducting needs assessments.

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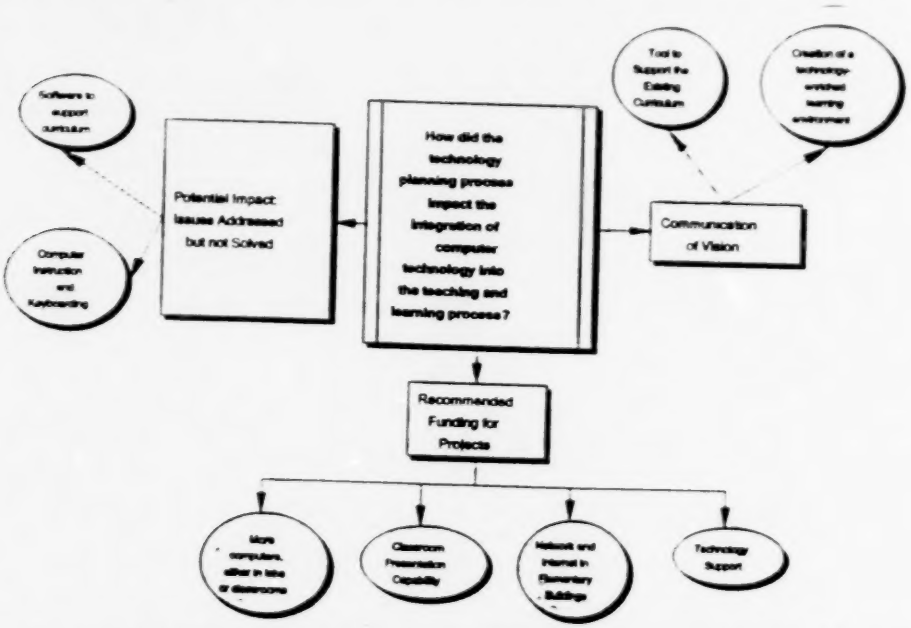
The Technology Plan was written over a period of one school year. The process required the committee to make many decisions related to vision, goals, and priorities for action. They divided into subcommittees for some of their tasks, but they came together to vote on priorities at the end of the year. The plan was completed and presented to the school board in May, 1997. It was approved and implementation of the plan began immediately. Unlike many of the school districts in Iowa, Boone CSD did not limit itself to one year of planning. The Technology Committee continued meeting monthly during the 1997/98 school year and the 1998/99 school year, adding written updates yearly. The committee adjusted their planning by adding students to the committee and by establishing different subcommittees as needs arise. The Technology Committee's decisions continue to drive the development of technology resources within their district.

The connection between the technology plan and the resulting use of technology at the upper-elementary level in Boone CSD was examined by document analysis of the plan using Kimball's (1996) components of a strong plan and through interviews with committee members, administrators, and classroom teachers. Two areas of impact emerged from the data: "Communication of the Vision for Technology" and "Funded Projects Impacting Classroom Integration." A third area of discussion related to "Potential Impact," which includes planning decisions that have not yet been resolved by the district. See Figure 2, Technology Plan's Impact on Integration, for a diagram of the concepts that emerged relative to this research question.

Figure 2
Concept Map of Research Question 2: Technology Plan's Impact on Integration


Potential Impact: Issues Addressed but not Solved
How did the technology planning process impact the integration of computer technology into the teaching and learning process?
Communication of Vision
Recommended Funding for Projects
Technology Support

The *Educational Technology Plan* (Boone CSD, 1997) included a strong statement of the committee's vision of the role of technology. The following statement communicates that vision clearly:

> Integrated technology is an essential element of both active learning and schools as learning communities. It is the use of a computer as a tool in the classroom, where students and teachers have immediate access when needed to pursue a specific line of inquiry, build meaning, or interact locally or globally, through the use the Internet/World Wide Web. (BCSD, 1997, p. 8)

Student use of technology is stressed, rather than instructional management uses. Technology is referred to as a tool to support the existing curriculum, rather than a subject area. The plan's stated goals include one related to improvement of student performance in the areas of reading, writing, speaking, listening, mathematics, reasoning, studying, and technological literacy. Another goal addresses the creation of "learning environments which make use of technology for problem solving, critical thinking, creating and designing" (Boone CSD,

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1997, p. 5). The learning environments are to be provided early in the student's schooling and include quality facilities with flexible access and appropriate personnel to support their use.

When comparing the plan's stated vision of the role of technology with the teachers' views, we see many of the same elements. Teachers most often described the role of technology at the elementary level to be a tool to support the curriculum in areas such as writing, communicating, and research. A fifth-grade teacher expressed her belief:

> I hope that students are seeing the technology as a tool to help them with research, like when we use the various CD-ROMs. With word processing, they see that it is a tool for them to communicate their finished published product. They should be getting to the point where they work fairly independently. They're using it as a tool to get to some of those other kinds of things like research and publishing.

It is unclear whether the committee's vision about the role of technology helped influence the teachers' visions. It could be the case that the committee represented the teachers well and that the resulting vision reflected the teachers' beliefs. In any case, the plan helped to reinforce the idea that technology is a tool to support the curriculum, to enrich students' learning, and to prepare students for the technological future.

A notable way that the technology plan impacted the integration of technology in the upper-elementary classrooms was through the recommendation of project funding in the areas of networking, hardware, and technical support. Resources provided in the plan allowed more student access to technology. However, as issues moved closer to curriculum and pedagogy, the committee seemed to have more difficulty identifying options and solutions.

The technology planning process had a significant and positive impact on student use of technology in the upper-elementary classrooms. This was achieved through the committee's communication of a vision of technology-enhanced learning and through funding of technology projects such as Internet, email, computer presentation capability, and two multimedia computers in each classroom. The difficulties seem to reside in areas that are outside the Technology Committee's scope of responsibility, namely the curriculum and pedagogy at the upper-elementary level. The existing district committee structure provides a means to address those issues, but the funding does not follow the responsibility. Again, this is an area for continued collaboration and planning.

Conclusion

The qualitative case study showed that Boone CSD was successful in writing an effective technology plan to lead their district through establishment of a technology infrastructure, including a district-wide network, Internet access to all classrooms, and high quality staff development. A strong technology committee evolved whose members built expertise, made difficult decisions about complex issues, developed a plan, and managed the change process over three school years. Leadership relative to instructional use of technology emerged from the administrators, support staff, and teachers throughout the district. Teachers, students and principals were eager to establish greater integration of technology into the formal curriculum of the school district.

The technology plan helped to communicate a shared vision about the potential impact of technology on student learning and preparation for their future. The vision was multi-faceted, including technology as a tool to support the existing curriculum and creation of a powerful learning environment where students can use technology as a way to solve problems. However, there is more to making these changes than providing access to classroom computers, display capabilities, and an Internet connection. Use of technology to support learning or to solve authentic problems does not come from exposure to technology alone. Teachers need to develop expertise in curriculum, technology, and effective teaching strategies in order to make the vision attainable. Boone CSD's committee structure appeared to make this difficult because the technology expertise had been isolated from those making curriculum decisions.

This research showed that the technology plan and planning process provided the means to integrate technology, but more work remains to be done before teaching and learning change significantly. As the issues move away from infrastructure and closer to curriculum and pedagogy, the decisions move away from the technology leaders and the Technology Committee. It became increasingly apparent to the researcher and the district's educators that curriculum leadership needed to join with technology leadership in order to take the district to the next step in this process. The results reveal the district has progressed in terms of technology integration, but the results must be seen in the context of looking at only one small part of a longer journey of school improvement.

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